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ABSTRACT

This study examined the digital divide in San Diego County (California), conducting background research, reviewing published studies, and surveying county residents on computer ownership, computer use, and demographics. Results indicated that computer skills were fast becoming essential. Nationally, it was projected that 60 percent of jobs required technology skills. Locally, of the 30 occupations surveyed at 400 employers, 80 percent had computer software requirements. San Diego was ahead of the nation in bridging the digital divide, though a significant divide still existed. Wealthy households were twice as likely to own computers as low income households. The college educated were twice as likely to own computers as those with elementary education. Nationally, those with college degrees were more than four times as likely than those with an elementary school education to own a personal computer. Hispanic and African American households were twice as likely to not own computers as Caucasian and Asian American households. Hispanics were significantly disadvantaged in terms of computer ownership and knowledge of technology. African Americans were the most likely to be totally detached from the information age. For families, the digital divide was most significant among single parent households and older people in family settings. Recommendations for action include providing outreach to the unwired on the use and benefits of information technology and convening community forums to discuss best practices and techniques. (Contains 21 figures, 6 tables, and 26 references.) (SM)

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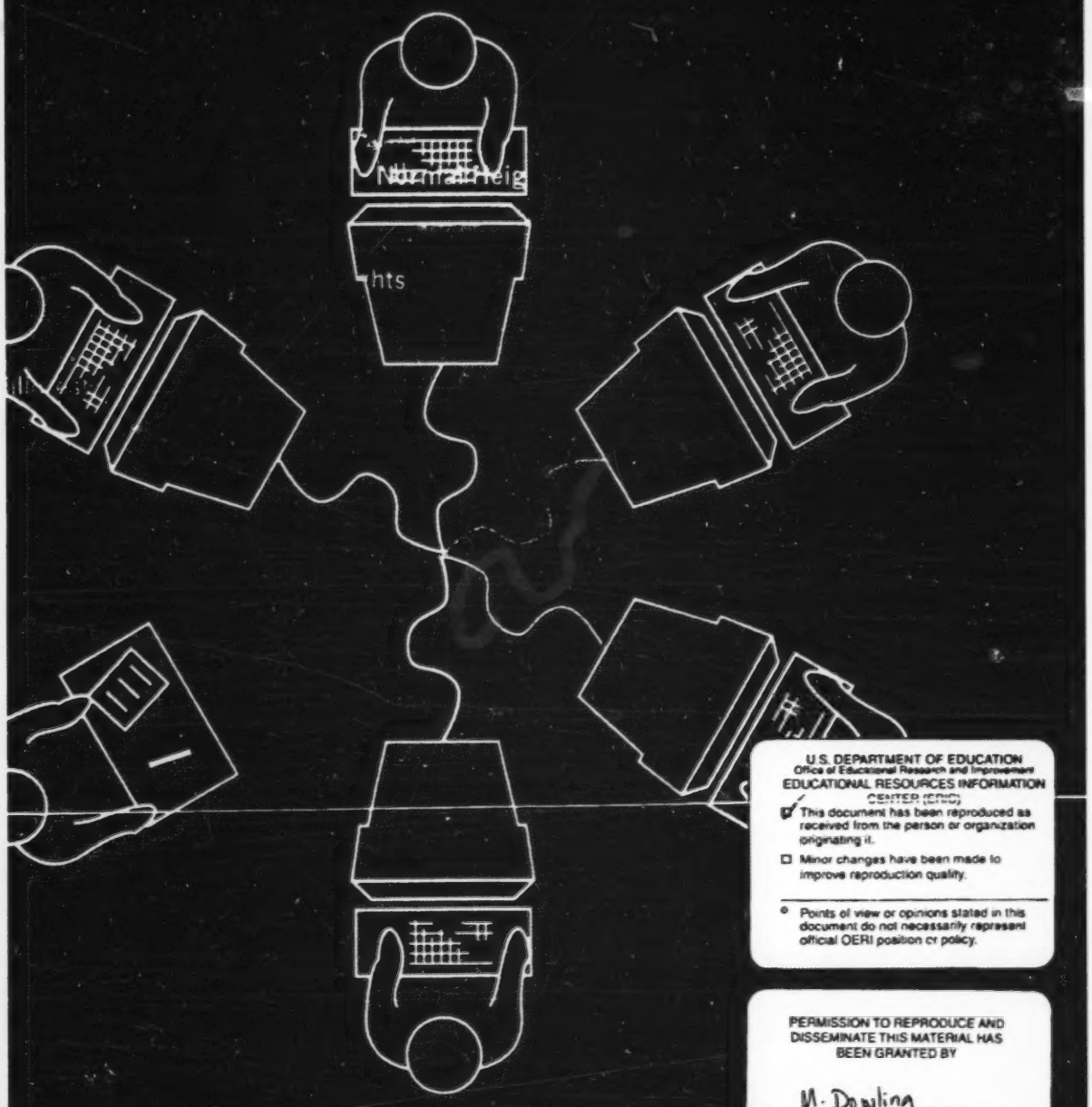

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About the Regional Technology Alliance

The Regional Technology Alliance (RTA) is a private/public partnership that serves as a catalyst for economic development by:

- Equipping entrepreneurs with the tools to develop their technology businesses,
- Creating partnerships between the private and public sector to bridge the "digital divide" and create a skilled workforce for our region's future, and
- Conducting research to educate the region on its technology strength.

The RTA was established under the California Technology Trade & Commerce Agency by California legislation in 1993 in response to the 1990s defense downsizing and base closures. The RTA, a non-profit corporation, focuses on general technology development through the following programs: entrepreneur services, community development services, and research.

This research report was conducted under the direction of the RTA's Community Development Program. It is in conjunction with the release of this report that the RTA launched "Digital Connections," an expansion of the RTA's Community Development outreach initiative. The RTA wishes to thank its Board of Directors for their wise counsel on this project.

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This study is a product of the Regional Technology Alliance (RTA). The RTA is dedicated to providing assistance to San Diego's technology community through direct business assistance, public and private partnerships to bridge the digital divide, and research and education to promote sustainable tech-based economic growth.

The RTA would like to especially acknowledge the Waitt Family Foundation for funding the release of this study. Their support and input has proved significant, and with their help the RTA is able to provide this report.

The RTA wishes to thank the California Technology Trade and Commerce Agency for helping to fund the survey conducted for the report, as well as their ongoing support to help bridge the digital divide by revitalizing our region's underserved communities through technology and economic development. A special thanks to Deputy Secretary Joe Raguso for his leadership in helping to bridge the digital divide on local, state and national levels.

The RTA also thanks the San Diego Workforce Partnership, especially Larry Fitch, Terri Bergman and Karen Goyette, for their early contribution to the implementation of the digital divide survey, and for their partnership with so many other valuable regional studies.

The staff and associates of the RTA extend a special note of thanks to Susan Myriand, Principal of Interactive Media Management, for generously sharing her expertise, advice and time for the report's preparation and release. Her assistance was invaluable.

Most importantly, the RTA wishes to thank the many academic, public and private sector leaders who generously contributed their time and experience to this report. The RTA would particularly like to note the contribution of the University of California, San Diego, Civic Collaborative members, Mary Walshok, Dan Yankelovich and Barbara Lee, for generously donating their time and expertise to the development of the survey used for this report. We would also like to thank Phyllis Sensenig and Ken Fawson, with the San Diego Community College District, Ilya Zaslavsky of the UCSD Supercomputer Center, and Keith Pezzoli of UCSD's Urban Studies and Planning Program. Additional recognition goes to Darin Forkenbrock for his assistance with the preliminary background research.

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Foreword

By Keith Pezzoli, Ph.D.

UCSD Urban Studies and Planning Department

The revolution in information technologies over the past three decades has radically transformed the ways in which we produce, consume, manage, cooperate, communicate and learn. Indeed, this transformation is so profound that some scholars argue we are entering an "Information Age" where the most prized assets are knowledge-based. Manuel Castells (1996), for instance, suggests that we are witnessing the emergence of a new post-industrial "informational mode of development" in which telecommunications and computers play an increasingly vital role in the growth of productivity (i.e., the production of surplus value in our economy). A major concern of those writing about the rise of the informational economy is that it seems to be exacerbating, rather than closing, the divide between rich and poor in our society.

The RTA's benchmark report, "Mapping a Future for Digital Connections," clearly expresses this concern. Significantly, the report acknowledges that the dynamics driving the digital divide are not merely technological; they are embedded in broader social, cultural and economic forces. This is a crucial observation. As the study's findings suggest, the digital divide is only partly determined by income and level of access to computer boxes and wires; it is also an issue of human and social capital, attitudes, beliefs and expectations. This is why the RTA's call for educational outreach, coupled with support for community technology centers, is so important. The digital divide hinders knowledge networking—defined by the National Science Foundation (NSF) as "attaining new levels of knowledge integration, information flow, and interactivity among people, organizations and communities" <see http://www.nsf.gov/kdi>. This is cause for concern. The need for low-income communities to be able to effectively engage in knowledge networking through the use of information technology is bound to increase as "digital government" initiatives become more pervasive. Take, for instance, the example of pollution prevention and concerns about environmental justice.

Tietenberg (1997) notes how efforts to inform the public about pollution forms the basis for what has become the "third wave" in pollution control policy (the first being legal regulation; the second, market-based instruments). An example of this can be seen in the EPA's toxic release inventory (TRI) website with interactive mapping capabilities designed to enable individuals and community groups to locate potentially risky sites of toxic emissions. The level of investment in information strategies is likely to rise. There are a number of reasons for this. Rising benefits and falling costs (to collect, aggregate, and disseminate information), coupled with times of fiscal austerity are bound to make information strategies an attractive method to complement regulatory efforts. But the benefits will be uneven, and as Schon et al. (1999) argue, it is naive to think that the development of advanced information technology will necessarily benefit low-income communities. In this regard, the RTA report acknowledges a major paradox, namely that information technology embodies both peril and promise.

On the one hand, one may expect peril if the status quo prevails and an ever-increasing number of digitally detached individuals and families end up deepening inequitable patterns of income polarization and sociospatial segregation. On the other hand, the same technology is viewed as a promising source of empowerment insofar as it can be used to build digital connections that increase the collective well-being of those who are now unfairly disadvantaged. Which will we see more of in San Diego, the peril or the promise? Will we see more of the status quo or a progressive advancement of countervailing strategic initiatives of the sort called for by the RTA? The RTA suggests a number of paths to get us on the latter trajectory. And the rationale for doing so is not merely based on normative arguments about social justice and equity—powerful as these may be. The report co-joins

equity and economics to offer a holistic view of possible solutions and recommendations for galvanizing action. The RTA's holistic analytic framework and recommendations resonate with important new findings that are expressed in the fast-growing literature on the "new regionalism" and the sociology of "state-society synergy."

The RTA's mission is regional in scope. As such, it is a member of an increasingly significant class of regional actors around the country. A recent report by the National Academy of Public Administration (NAPA) <see http://www.napawash.org> explains why there is a rising interest in "thinking regionally." One set of factors concerns the challenge of developing a quality workforce to maintain regional competitive advantage. Economic geographers and the new regionalists argue that a growing digital divide undermines workforce development and can be a serious drain on a region's economy (Storper, 1997). Hence, as the RTA report suggests, one way to justify investments designed to build digital connections is to classify them as investments in regional competitiveness. The report ends on a prescriptive note that identifies state-society synergy as a way to move forward. Synergy of this sort can catalyze collaborative action by bringing together concerned citizens and organizations representing business, community, government, financial and educational interests. In our increasingly complicated and globalizing political economy, there is no singular progressive agency one can pin hopes on for realizing the good society. Progress toward building digital connections will depend on what Peter Evans calls "ecologies of agents" in which communities, non-governmental organizations, public agencies, and industry leaders collaborate in synergistic ways (Evans, forthcoming). The RTA, in partnership with San Diego's research universities (including, for instance, UCSD's Civic Collaborative), is well positioned to take the lead in this process. This report is an important step in the right direction.

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Executive Summary

Many divides segment society. Ethnic divides, education divides, and income divides all impact our societal structure. But there is another divide that both results from and causes these societal divides. This divide, the digital divide—the fact that certain groups do not access computers and the Internet—has both equity and economic impacts.

As an equity issue, the divide makes government and commercial services more difficult to access and robs those on the unwired side of the divide of modern life's curiosity and splendor. As an economic issue, the divide has both present and future effects: it carves out a segment of the population from the modern-day workplace and fails to prepare the future workforce for tomorrow's jobs, the vast majority of which will require some computer skills. Even if computer prices plummet, without significant and meaningful access now, an entire population will not acquire the essential communication skills to work and function in modern society; they will be left behind. So if the digital divide persists, information technology will exacerbate, rather than remove, society's divisions.

The Regional Technology Alliance (RTA) engaged in this study to examine the state of San Diego's digital divide. The RTA saw firsthand the problem that the digital divide presented, after assisting community centers throughout San Diego County to acquire information technology. Furthermore, at the national level the National Telecommunications and Information Administration of the U.S. Department of Commerce conducted a comprehensive quantitative survey of the extent of the digital divide. But at the regional level, the extent of San Diego's digital divide was not known. For the community to solve this community problem, the RTA sought to understand the scope and dimensions of San Diego's digital divide.

Consequently, the RTA initiated this six-month study by conducting background research on the digital divide and surveying the literature of published studies. The RTA conducted a comprehensive survey of 1,000 County residents, querying them on computer ownership, computer use and various demographic profiles. A statistician analyzed the data to understand the impacts of various factors. And this analysis was balanced by interviews of those impacted by the divide.

In its survey and analysis, the RTA made the following findings:

- Computer skills are fast becoming essential; nationally, it was projected that 60% of jobs required skills with technology. Locally, of 30 occupations surveyed at 450 employers during the summer of 2000, 80% had computer software requirements.
- San Diego is ahead of the nation in bridging the digital divide. Nevertheless, a significant divide exists. In San Diego, wealthy households are twice as likely to own computers as low-income households. The college-educated are twice as likely to own computers as those with elementary education. Hispanic and African-American households are twice as likely to not own computers as Caucasian and Asian households.
- In San Diego, 81% of Asians and 80% of Caucasians own computers, while only 59% of African-Americans and 52% of Hispanics own computers. 74% of Caucasians and 72% of Asians access the Internet at home, but only 52% of African-Americans and 41% of Hispanics access the Internet at home.

- Hispanics are significantly disadvantaged—both in terms of computer home ownership and in knowledge of technology. The divide between Caucasians and Hispanics, in terms of computer ownership and household Internet access, is greater in San Diego than in the nation as a whole. Although an increase in household income appears to eliminate the digital divide for African-Americans, it appears to have less impact for the Hispanic population. Among full-time employees, Hispanics have the lowest rates of Internet connection (78%, or 16% below average for full-time employees). Even though Hispanics make up 25% of the general population, they represent 42% of the unwired population. Finally, two-thirds of Hispanics believed that people rely too much on technology, and one-third without computers do not have them because they do not know how to use them.

- African-Americans are also disadvantaged. Of all the ethnic groups, African-Americans are the most likely to be totally detached from the information age, with one of every four African-Americans not accessing either a home computer or an outside Internet terminal. Cost was the number one reason why African-Americans and Hispanics did not purchase computers or access the Internet from home.

- For families, the digital divide is most significant among single-parent households and those 65 and older in family settings. The divide impacts youth and families. Of all households, single parents have the lowest computer ownership rates, 64.47%, 20 percentage points behind the highest family group—two-parent families with children. The elderly are the least likely to own a computer (52%) and have household Internet access (47%), the least likely to buy a computer (15%), the least likely to use the Internet for anything but email, and most likely to say they do not want Internet access (24%).

- General education and education about technology matter. For those with a high school education or less, education level was found to be more significant than ethnicity in determining home computer ownership. Furthermore, a lack of knowledge and education about technology was most prevalent among the disadvantaged groups. One-third of African-Americans, Hispanics, homemakers, the elderly, the low-income (less than $20,000 annual household income), the less educated (with high school education or less) said they did not own a computer because they did not know how to use one. And two-thirds of respondents who earn less than $15,000 per year believe that people have come to rely too much on technology.

- Communities with computers—and community resources—can help. For those who were totally detached (they neither owned a computer nor accessed the Internet outside their home), ethnicity, income, and education level were less significant than the fact that few people they knew use computers. Of all ethnic groups, African-Americans are the most likely to use community centers to access the Internet, and of communities that do not own computers, Hispanics (31%) are the most likely to use the Internet outside their home. Furthermore, those without home Internet access were more likely to use public libraries (22% v. 15%) than those with home Internet access.

In light of the findings that are further explored in this report, the RTA recommends the following action items for San Diego:

1. **Outreach to the unwired to educate them on the use and benefit from information technology.**
   Because the most technologically detached do not know people who use computers, and because the research revealed this was a clear component in their being unwired, conduct workshops and seminars in communities where few computers exist, discussing strategies to receive donated equipment.

2. **Support Community Technology Centers and programs that enhance community technology centers.**
   Community technology centers represent a decentralized and targeted method to assist unwired communities. The physical and social environments provide a place for people to learn how to use computers and the Internet. A number of San Diego programs help start community technology centers, including Waitt Family Foundation's PowerUP in San Diego, a program that provides equipment and networking. Furthermore, initiatives like the RTA's Digital Connections program can help continue community technology centers once they are started. A comprehensive program that plans, supports and trains community technology centers can help close the digital divide.

3. **Investigate novel methods to support computer ownership and Internet access.**
   From keeping libraries open longer to loaned computers for public employees to subsidies for the most disadvantaged, novel methods should be explored to connect those who are not connected.

4. **Convene a community forum to discuss best practices and techniques.**
   Because this community problem requires community solutions, a forum that brings together business leaders, community leaders, education leaders and foundation leaders could produce some novel methods—and understand what works now. By learning what is being done in this area, identifying specific problems, and focusing on programs that work, the community can accelerate steps toward bridging the divide.

The insidious digital divide is a simple problem with enormous implications: not accessing and understanding how to use computers and the Internet cuts off significant populations from modern social and economic life. As a matter of equity and economics, the issue poses concern. San Diego must now demonstrate the initiative to solve this community problem.

In this report, the RTA seeks to take the first step in identifying the extent of San Diego's digital divide and recommending regional solutions to begin building the bridge.

Introduction

The digital divide is more than an issue of equity. Clearly, segments of the population lack what has become a basic communication tool—computers and the Internet—and as a consequence they are separated from part of the curiosity, wonder and splendor of modern life. But more than an equity issue, the digital divide presents a significant economic issue. Those without the tools for tomorrow cannot become the technicians of tomorrow. And even if computer prices plummet, without significant and meaningful access now, an entire population will not have the skills necessary for current and future jobs. Those without the tools to access and understand technology will be further segmented from society, left behind and unable to benefit from—or contribute to—our advancement.

The Regional Technology Alliance (RTA) engaged in this study to examine the state of San Diego's digital divide. Since 1998, the RTA has worked with many other organizations to eradicate this divide by assisting community centers—YMCAs, training groups, and other organizations serving the disabled and disadvantaged—in acquiring computers and high-speed data access. The RTA saw firsthand the difference that technology makes: in one center, where 95% of constituents had never used computers before, computers are now ubiquitous.

Based on national reports, the RTA realized that the digital divide is a pernicious problem. But the extent of San Diego's divide was unknown. And it is impossible to conquer a problem before knowing its extent.

The RTA embarked on this six-month initiative to determine the extent of San Diego's digital divide and areas of particular concern. The RTA examined numerous national and local studies of the digital divide, assessed the extent of the divide through the RTA's specific program and that of other agencies, and conducted a comprehensive survey of 1,000 San Diegans, the largest survey of the digital divide in San Diego. Specifically, the RTA tracked its questions with that of the ongoing and comprehensive national studies conducted by the U.S. Department of Commerce's National Telecommunications and Information Administration.[1]

Fittingly, this report will center on San Diego issues and the specific facts confronting our community. The report will examine the digital divide's definition and its significance and will then focus on the extent of the digital divide in San Diego, potential implications from the divide, and possible reasons for the divide. Finally, the report will chronicle particular strategies that can erase the divide and recommend specific actions for the future.

This report's purpose: to identify the problem of the digital divide, examine possible solutions, and galvanize action. Indeed, San Diego's digital divide is a community problem with a community solution.

[1] U.S. Department of Commerce. Closing the Digital Divide. January 2, 2001. http://www.digitaldivide.gov/.

The Definition of the Digital Divide—and Its Significance

The digital divide focuses on how different groups access computers and the Internet. Today, 50% of U.S. households have Internet access, and by 2005, 75% of households are expected to be connected.[2] However, despite a strong economy, lower-cost personal computers and phenomenal growth in the Internet, a Digital Divide still exists in the United States. Minorities, people with low incomes, the less educated, and children of single-parent households (especially those who reside in rural areas or central cities) are among the groups that do not have access to information resources.

This divide is a complex problem that cannot be defined just as a lack of access to information technology—at issue is "the ability of citizens to participate fully in the new Information Age in ways that ensure equality of opportunity in social, educational, political and economic systems."[3] Furthermore, the digital divide has current and future economic implications—without a trained workforce, the entire economy will suffer because a segment of tomorrow's workforce will lack the necessary skills.

- There is a broad economic need for a well-educated, well-trained workforce.[4] There is a growing demand for highly skilled information technology workers who can run equipment, and collect, process and communicate information.[5] Throughout the United States, "an estimated 350,000 jobs for computer programmers, system analysts and computer scientists are currently unfilled."[6] The Bureau of Labor Statistics projections indicate that "between 1998 and 2008, more than two million new skilled workers will be needed to fill newly created jobs and to replace IT workers leaving the field."[7] Approximately 75% of these present and future job openings require a college degree in a technical field and as many as 90% of the positions are expected to be found in small, non-IT companies, illustrating the importance of a highly educated and technically proficient workforce.[8]

  And computer skills are becoming baseline requirements for many jobs.[9] In fact, four years ago, 42% of production and non-supervisory employees in manufacturing and service establishments used computers,[10] and it was projected that last year, 60% of jobs required skills with technology.[11] "The demand for workers who can create, apply and use information technology goes beyond the software industry, cutting across manufacturing and services, transportation, health care, education and government."[12] Locally, for example, of 30 occupations—ranging from auto mechanics to accounting clerks—surveyed from more than 450 local employers during the summer of 2000, 80% had computer software requirements (basic computer skills and combinations of either word processing, spread sheet, database and Internet software knowledge).[13]

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2 Mark Smolenski, *Gartner's Digital Divide Report* (New York: Gartner, 2000) 1.

3 James Bohland, Maria Papadakis, and Richard Worrall, *Creating the CyberSouth* (Virginia, 2000) 5.

4 Bohland 5.

5 21st Century Workforce Commission, *A Nation of Opportunity: Strategies for Building America's 21st Century Workforce* (Washington, 2000) 5 http://www.workforce21.org/downloads/report1.pdf.

6 The Children's Partnership, *Online Content for Low-Income and Underserved Americans* (Santa Monica, 2000) 34.

7 21st Century Workforce Commission 16-17.

8 21st Century Workforce Commission 16-17.

9 Lisa Stuart, U.S. Department of Commerce, U.S. Department of Education, U.S. Department of Labor, National Institute of Literacy, and the U.S. Small Business Administration, *21st Century Skills for 21st Century Jobs* (Washington, 1999) 2 http://www.vpskillsummit.org/bestpract.asp.

10 National Center on the Educational Quality of the Workforce, *First Findings from the EQW National Employer Survey* (Washington: 1995) 8 http://www.hroonline.com/lib/training/eqwscv2.html.

11 Benton Foundation, *Losing Ground Bit by Bit* (Washington, 1998) 4 http://www.benton.org/Library/Low-Income/.

12 Carol Ann Meares and John F. Sargent, Jr., U.S. Department of Commerce, Technology Administration, Office of Policy, *The Digital Workforce: Building Information Technology Skills at the Speed of Innovation* (Washington: 1999) 11 http://www.ta.doc.gov/Reports/itsw/digital.pdf.

13 Gary Moss, San Diego Workforce Partnership Labor Market Information Specialist, personal interview, 16 January 2000.

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- In addition, the digital divide may create an information underclass, exacerbating inequality by stymieing access to information and services online, including government information and services. The Internet is an employment and educational resource for the poor—low-income individuals tend to use the Internet to look for jobs and to take classes more than other Internet users.[14] As the Internet continues to grow in importance as a resource for information and services, access becomes more important.

"Bridging the Digital Divide is most fundamentally about preventing an information underclass in American society. As information and its management become more central to our nation's economic vitality and individual quality of life, we run the risk of creating a new stratum of underprivileged communities that fall further and further behind the rest of society."[15]

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[14] U.S. Department of Commerce, National Telecommunications and Information Administration, Falling Through the Net: Defining the Digital Divide (Washington, 1999) 63.

[15] Bohland, et al 6.

TESTIMONIAL

Marco was out of school for almost four years before he decided to go back and get his high school diploma through the San Diego Urban Corps Charter School. Marco went to school in Chula Vista where he still lives, but because of his involvement with gangs he was forced to drop out of school during his junior year. "I was in one gang, and there were different gangs that we fought with, and finally one gang told me they were going to shoot me after school, or something like that. I never went back," Marco explains.

Now at age 23, Marco looks back on that time and knows he has matured. "I grew out of all that and decided it was time to do something for myself and go back to school." He likes attending the Urban Corps because many of the other students are like him. "We are not ashamed, and we can hang out and all get along," Marco adds.

He believes that knowing how to use computers and the Internet is a "huge advantage" today. "They say computers are going to be the future," states Marco. "I know one of my cousins is taking computer training and he says it is pretty good and he tells me about the pay he'll make once he is done. That would be something I would be very interested in." Marco would like to own a computer very soon, but he is not sure how to find a good one that he can afford. "I had a computer once that my mom got from a friend, but my brother messed it up, so my mom had to give it back."

"If we had a computer at home it would also help my little brother and sister with their homework. My neighbors have a computer that I can use sometimes, and they show me different things. Computers are important at the Urban Corps because that's the only place a lot of us use them, besides at a neighbor's house or something."

Marco is graduating in June 2001, and is considering joining the United States Navy.

The Extent of the Divide, the Impact of the Divide, and Some Potential Rationales

The divide carves out our society along ethnic, income, education and other lines. The following subsections detail the extent of San Diego's divide. To the point it is relevant, each subsection presents issues that outline the extent and impact of the divide, and some potential rationales for the divide. Although general statements are difficult to make, in the aggregate, ethnicity and education level play compelling roles in creating the San Diego divide.[16]

Ethnicity

Extent of the Divide

At low-income levels, ethnicity influences whether a household owns a computer or has Internet access. Nationally and in San Diego, Hispanic and African-American households still lag significantly behind Caucasians and Asians. Nevertheless, certain factors, such as buying plans and income levels augur that this divide can be closed.

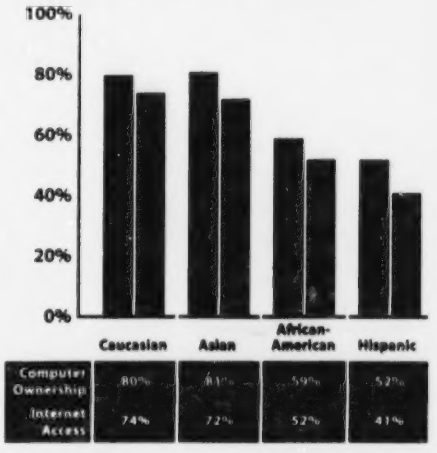
There is a clear division between Hispanic and African-American households and Asian and Caucasian households for home computer ownership. Nationally, about half of all Caucasian and Asian households own computers and have access to the Internet, compared to one-third to one quarter of African-American and Hispanic households.[17] In San Diego, 81% of Asian and 80% of Caucasian households own computers, compared to 59% of African-American and 52% of Hispanic households, as shown in Figure 1. Overall, this means that in San Diego, Hispanic and African-American households are twice as likely to not have computers as Asian and Caucasian households.[18]

San Diego household Internet statistics track computer home ownership, as shown in Tables 1 and 2. In San Diego, the rate of Internet access exceeds the national average for all ethnic groups except Hispanics. The overall rate of Internet access in San Diego is 66%; 74% of Caucasian households, 72% of Asian-American households, and 52% of African-American households have Internet access. In San Diego, 41% of Hispanic households have Internet access, which falls below the national rate for Internet penetration.

For African-Americans in San Diego, the gap between ethnic groups replicates national trends, as shown in Tables 1 and 2. Nationally, the gap in computer

Figure 1

Ethnic Differences in San Diego



Source: RTA Survey

Table 1

Computer Ownership [19]
U.S. v. San Diego by Ethnicity

Ethnicity	U.S.	San Diego
Caucasian	55.7%	80%
African-American	32.6%	59%
Asian & Pacific Islander[20]	65.6%	81%
Hispanic	33.7%	52%
All Groups	51%	73%

Table 2

Internet Penetration [21]
U.S. v. San Diego by Ethnicity

Ethnicity	U.S.	San Diego
Caucasian	46.1%	74%
African-American	23.5%	52%
Asian & Pacific Islander[22]	56.8%	72%
Hispanic	23.6%	41%
All Groups	41.5%	66%

16 Ilya Zaslavsky, Ph.D., economic analysis January 2000. Because the data is significantly nonlinear, no statistically significant demographic factor appeared besides level of education, which represented a fairly weak significance. As a consequence, the data was analyzed examining two pairs of factors, such as ethnicity and education level, or income and education level, to determine the relative contribution in determining a particular scenario, such as computer home ownership.

17 U.S. Department of Commerce, National Telecommunications and Information Administration, *Falling Through the Net: Toward Digital Inclusion* (Washington, 2000) 13 (hereinafter NTIA report).

18 RTA Survey.

19 NTIA report.

20 San Diego data references Asian population only.

21 NTIA report and RTA survey.

22 San Diego data references Asian population only.

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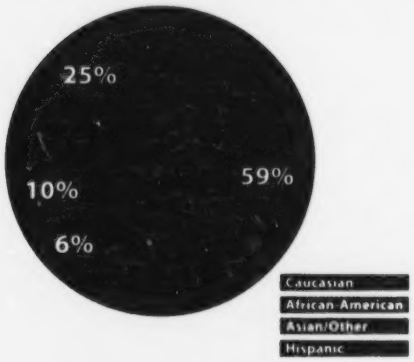
Figure 2

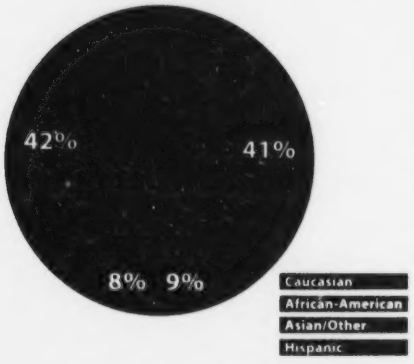
San Diego Population by Ethnicity



Source: RTA Survey, SANDAG data 2000

Figure 3

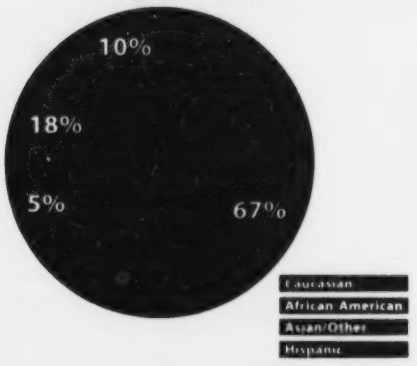
The Unwired Population in San Diego County by Ethnicity



Source: RTA Survey, SANDAG data 2000

Figure 4

The Wired Population in San Diego County by Ethnicity



Source: RTA Survey, SANDAG data 2000

ownership between African-American and Caucasian households was 23.1 percentage points; the gap was 22.6 percentage points for Internet access.[23] In San Diego, the gap is the same: the computer gap was 21 points and the Internet gap was 22 points.[24]

However, the gap between Caucasian and Hispanic households is greater in San Diego than nationally. Nationally, Hispanic households were about slightly more than half as likely to own a computer and half as likely to have Internet access as Caucasians.[25] As shown in Tables 1 and 2, in August 2000, the gap in computer ownership between these two groups was 22 percentage points; the gap was 22.5 percentage points for Internet access.[26] On the other hand, in San Diego, the computer ownership gap is 28 percentage points and the household Internet gap is 33 percentage points.[27] So even though San Diego's Hispanic households are much more likely to own a computer than nationally (52% in San Diego vs. 33.7% nationally) and have household Internet access (41% in San Diego vs. 23.6% nationally), the divide in San Diego is more pronounced.[28]

Focusing on the population that is wired, as measured by computer ownership, and unwired is particularly striking and hones in on the disparity in Hispanic households. The focus of this analysis examines the entire population, the entire wired population, and the entire unwired population. As shown in the charts to the left, Hispanics represent 25% of the San Diegan population. However, in the unwired population—those who do not own computers at home—they are overrepresented, composing 42%. For African-American households, the disparity is not as significant; African-Americans make up 6% of the San Diego population, and 9% of the unwired population. [29] See Figures 2 and 3.

On the other hand, the wired population is significantly over-represented by Caucasians. Whereas Caucasians make up 59% of the population as a whole (see Figure 2), they represent 67% of the wired population. Hispanics and African-Americans are under-represented.

Differences in overall income and educational levels (see next sections) do not fully account for the lower levels of home Internet access among African-American and Hispanic households. In fact, after adjusting for the effects of income and educational attainment, the National Telecommunications Information Administration (NTIA) found that at the national level, roughly half of the gap remains.[30] "Reasons for these differences are not immediately

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23 U.S. Department of Commerce, National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide* (Washington, 1999) 14-16. The gap for Internet access widened since 1998.

24 RTA Study. Even though the percentage of San Diegan African-Americans online exceeds the percentage of African-Americans online nationwide, the same trend is true for San Diegan Caucasians. Therefore, the gap between San Diegan Caucasians and San Diegan African-Americans is the same as the national gap.

25 NTIA report 13-14.

26 NTIA report 13-14. For Internet access, the gap has widened since 1998.

27 RTA study.

28 NTIA report and RTA study.

29 San Diego Association of Governments. Statistics Page. January 2001. http://www.sandag.cog.ca.us/data_services/numbers_now/profiles/sdregion.html

30 U.S. Department of Commerce, National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide* xvii.

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obvious, but may include complex relationships between ethnicity, income, geographic location and household structure."[31]

More troubling, however, is the national trend in the divide: the Internet divide actually grew from 1998 to 2000 for African-American and Hispanic households—with the divide 3-4 points higher than in 1998—and the divide for computer ownership remains stagnant and large at 17 and 18 percentage points for African-Americans and Hispanics, respectively.

Despite the significant divide among ethnic groups and particularly the alarming division between Hispanic and Caucasian households, there are positive indicators on the horizon.

First, the divide appears to lessen for African-Americans (but not as dramatically for Hispanics) as household income increases, as shown in Table 3. For example, divisions almost disappear for African-Americans when incomes exceed $35,000 per year. In San Diego, at incomes less than $35,000 per year, the gap between Caucasians and African-Americans is 11 percentage points; at incomes greater than $35,000 the gap is 5 percentage points. For Hispanics, the ethnic gap is not reduced significantly at higher incomes. For incomes less than $35,000, the gap is 22 percentage points and only drops to 18 percentage points when income rises above $35,000.

In fact, according to a statistical run, at lower income levels ethnic differences appear to matter as much, or more than, income in determining computer ownership.[33] However, at higher income levels, ethnicity matters much less. As seen in Figure 5, the differential in computer ownership among ethnic groups seems to disappear when household income rises above $35,000 annually, although Hispanics are still 18 percentage points behind Caucasians.

Second, the divide among ethnic groups appears to diminish as education levels increase and, in fact, education level was deemed more significant than ethnicity in determining computer ownership.[34] In San Diego, at grammar school education levels, the gaps between Caucasian-African-American gap and the Caucasian-Hispanic gap is 18 percentage points and 29 percentage points, respectively. With some college, that gap closes to 23 percentage points for Hispanics. With a college education or more, the gap closes between 9 percentage points and 14 percentage points for African-Americans and Hispanics, respectively. See Table 4.

Based on Figure 6, Caucasian and Asians home computer ownership jumps with some college but does not appear to be influenced by whether they actually graduated from college. On the other hand, African-Americans and Hispanics

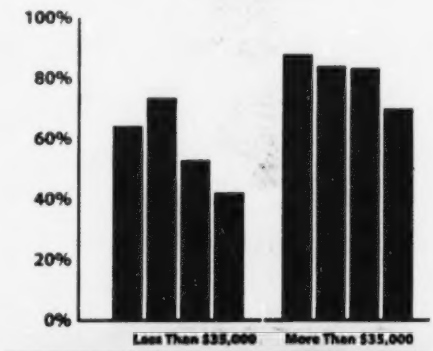
Table 3

The Ethnic Gap by Income [32]

	Less than $35,000	More than $35,000
Caucasian / African-American Gap	11.30%	4.53%
Caucasian / Hispanic Gap	21.93%	17.86%

Figure 5

Ethnic Differences by Household Income
Home Computer Ownership



	Less Than $35,000	More Than $35,000
Caucasian	64.24	87.86%
African-American	73.68%	84.21%
Asian	52.94%	83.33%
Hispanic	42.31%	70.00%

Source: RTA Study

Table 4

Closing the Ethnicity Gap with Education

	High School or Less	Some College	College Grad or More
Caucasian / African-American	18.27%	18.02%	9.35%
Caucasian / Hispanic	29.24%	23.17%	13.61%

[31] Bohland, et al. 14.

[32] The ethnic gap is determined by subtracting the percentage of African-American or Hispanics who own computers from the percentage of Caucasians who own computers.

[33] For Caucasians, income mattered more than ethnicity in contributing toward computer ownership.

[34] Zaslavsky, personal interview.

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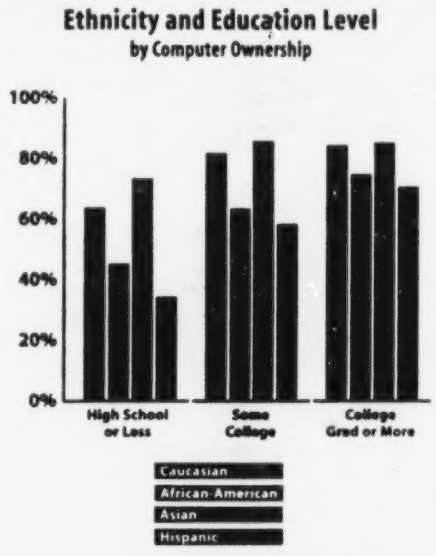
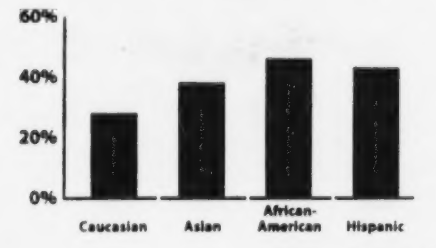
Figure 6



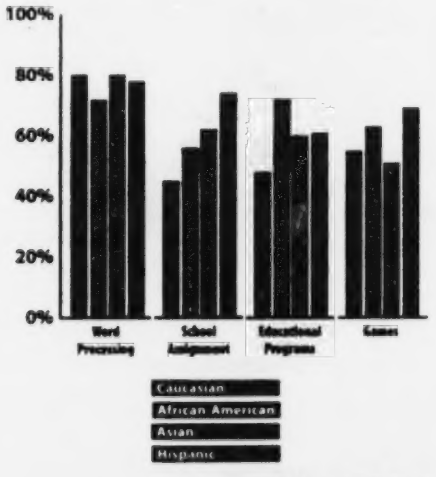
Source: RTA Study

Figure 7



Source: RTA Study

Figure 8



Source: RTA Study

tended to show an increased level of computer ownership as they moved up the educational ladder. In general, education level plays more of a differentiating role for African-American and Hispanic households than for Caucasian and Asian households. At the same time, for all ethnic groups the "grammar/elementary school" education level is consistently a more important factor for not having a computer at home, than is ethnicity. It would appear therefore that strategies targeting populations with "grammar/elementary school" education level could be better defined than strategies focused on particular ethnic groups.

Third, nationally, the rate of expansion of computer ownership and Internet access is considerably faster for African-Americans and Hispanics than it is for Caucasians. The percentage growth in computer ownership rates was 19.5% for Caucasian households, 40.5% for African-American households, and 32.2% for Hispanic households. The expansion rate of Internet access was 54.7% between 1998 and 2000 for Caucasian households; the expansion rate was twice as great for African-American households (at 109.8%) and about 1.5 times as fast for Hispanic households (at 87.3%). [35]

Fourth, in San Diego, African-American (46%) and Hispanic (43%) households indicated that they plan to buy a computer this year at a higher rate than Caucasian (28%) households, as shown in Figure 7. Somewhat expectedly, these numbers are even higher for those without computers—59% for Hispanics, 55% for Asians, 48% for African-Americans and 31% for Caucasians.[36]

The Impact of the Ethnic Divide

Although African-American and Hispanics are on the unwired side of the divide, their use of the Internet indicates that, with access, computers and Internet will be used for functions that can assist them in work and school. Furthermore, African-American and Hispanics clearly use public facilities to access the Internet more often than other ethnic groups. This indicates that improving access to public facilities could help bridge the digital divide.

With respect to computer use, as seen in Figures 8 and 9, there was a significant amount of uniformity in the data, with computer use focusing on word processing. However, African-Americans were most likely to use a home computer for educational programs (72%) and Hispanics were most likely to use a home computer for school assignments (74%). Similarly, although there is a good degree of uniformity among ethnic groups in using the Internet, there are some specific spikes: Caucasian and African-Americans are more likely to use the Internet for information and search; Asian, African-American and Hispanics

[35] NTIA report 24. The higher expansion rates for African-Americans and Hispanics is not inconsistent with a persistent gap between those ethnicities and Caucasians. Because Hispanics and African-Americans were so far behind, nationally, their computer ownership and Internet percentages must grow at a faster clip just to maintain the same percentage difference with Caucasians.

[36] This question represents intention, and there may be some inconsistency with other data points. For example, those who stated they intended to buy a computer in the coming year, also at some points said a significant reason for their not owning a computer was cost.

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are more likely to use the Internet for educational courses; and African-Americans are more likely to use the Internet for job searches than other ethnic groups.

Not only do African-Americans and Hispanics use the Internet for educational purposes in significant numbers, they also disproportionately use public facilities, most likely as a consequence of their proportionately lower home ownership. Hispanics (39%) and Asians (46%) access the Internet at school more than Caucasians (25%), as well as at libraries. Among the different ethnic groups, African-Americans (14%) are most likely to access the Internet at a community center. See Figure 10.

Potential Rationales for the Ethnic Divide

Because multiple factors interact, it is difficult to explain the rationale for the digital divide along ethnic lines. However, some key factors do emerge as reasons for not purchasing computers and obtaining Internet access: cost and ignorance about computers and their uses. To a certain extent, these factors are complemented by a general and disproportionate fear of technology. And finally, for the most disenfranchised groups (those without access to the Internet or computers) one key factor emerges: they appear not to own computers because they know few people who do.

African-Americans and Hispanics were the two groups most likely to cite the computer's expense as the reason for not owning one—African-American (52%) and Hispanic (39%), compared to Caucasians (26%). Similarly, for home Internet access, African-Americans are most concerned by cost (more than 45%), unlike Caucasians (25%). In addition, inability to buy on installment turns out to be a very important consideration from African-American (26%) or Hispanic (24%) households.[37]

Not only were African-Americans and Hispanics especially price-sensitive, they also were more likely to express negative feelings toward computers as reasons for not owning a computer. One-third of African-American and Hispanic households said they did not own a computer because they did not know how to use one, compared to Caucasian (22%) and Asian (18%) households. Furthermore, these households, along with Asian households, were more likely to not purchase a computer because they did not want to give their children access[38] (approximately 20% for all groups), compared to Caucasian households (9%).

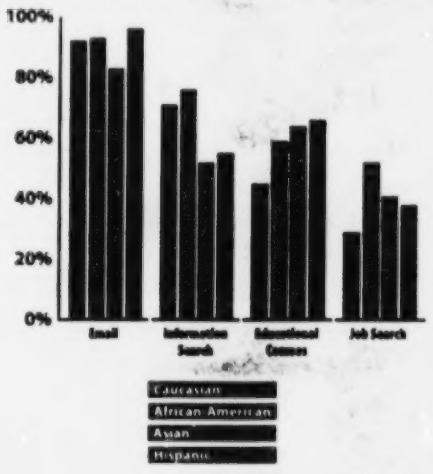
In addition to focusing on cost and knowledge, minority groups demonstrated negative attitudes toward technology. "Technology, particularly computers, poses a real threat to privacy and freedom" is a sentiment more prevalent among minority groups (except for Hispanics) than among Caucasians. 71% of Native

[37] Despite the importance of this stated inability to buy on installment, a higher proportion of such respondents still plan to purchase a computer next year.

[38] The question did not specify what kind of access to computers.

Figure 9

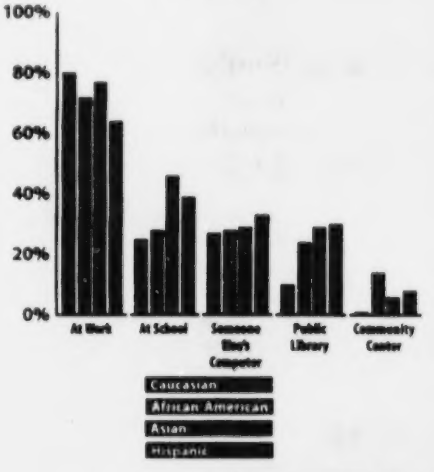
Internet Activities at Home by Ethnicity



Source: RTA Study

Figure 10

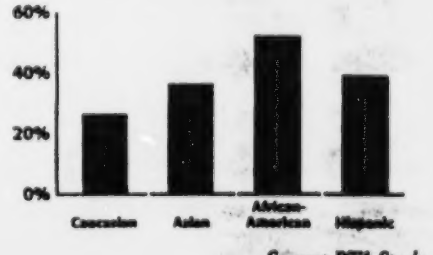
Internet Access Outside the Home
by Ethnicity



Source: RTA Study

Figure 11

Does Computer Expense Deter Buying?
Percentage "Yes" by Ethnicity



Source: RTA Study

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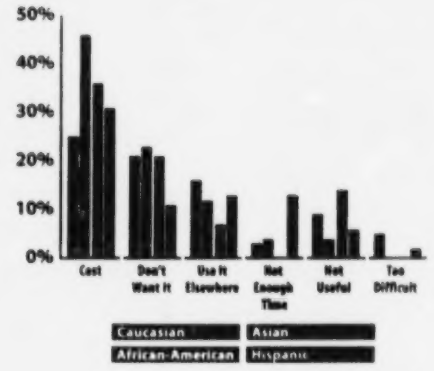
Figure 12

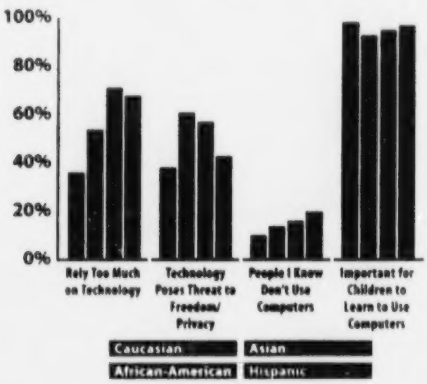
Reasons for No Internet Access at Home
by Ethnicity



Source: RTA Study

Figure 13

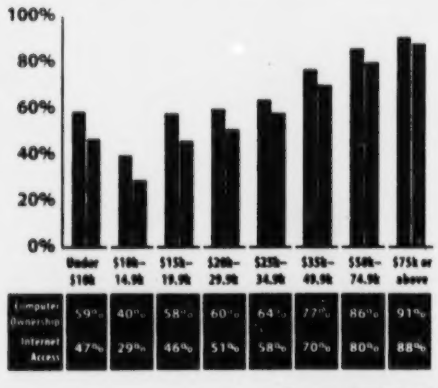
Beliefs Toward Computers & Technology
by Ethnicity



Source: RTA Study

Figure 14

Income Differences
Ownership and Internet Access



Source: RTA Study

Americans (27% above average), 61% of African-Americans (18% above average) and 57% of Asians (14% above average) feel this way. According to a statistical run, it does not appear, however, that concurring to this statement has any strong relationship with the digital divide as measured by home computer and Internet access rates. Further, 47% of respondents believed that people rely too much on technology, but 71% of Asians and 68% of Hispanics support this opinion (24 and 21 percentage points over average, respectively). See Figure 13.

Finally, for those most detached from the digital age, a total lack of knowledge was the most significant. Although most respondents stated they knew people who used computers, the digitally detached (those who do not have home personal computers, Internet access, or access to the Internet outside of the home) did not. And when compared with the impact of ethnicity, income, and education level, this sentiment—that they did not know others who used computers—is far more significant. This seems to indicate that for the most deprived, the environment does influence their willingness to use computers and the Internet.

Income

Extent of the Divide

Income has been cited as the single most important determinant of access to information technology.[39] In San Diego, it is not the predominant factor, and the range between wealthy and low-income is much narrower than nationwide. On the other hand, there is still disparity, and those in lower income brackets are more likely to have negative attitudes toward computers and the Internet.

The gap in Internet access and computer ownership by income in San Diego is not as wide as in national figures, as seen in Tables 5 and 6. Nationally, households with incomes over $75,000 have more than six times the level of Internet access and approximately 4.5 times the level of computer ownership compared to the lowest income groups.[40] Although as shown below, home

[39] Bohland, et al. 12.

[40] NTIA report 13-17.

[41] The high wired percentage for incomes under $10,000 appears to be biased by students, who represent one-third of that income class.

[42] NTIA report and RTA survey.

[43] NTIA report and RTA survey.

Table 5

Computer Ownership [42]
U.S. v. San Diego by Income

Income Level	U.S.	San Diego
Less than $15,000	19.2%	59%
$15,000 - $24,999	30.1%	58%
$25,000 - $34,999	44.6%	64%
$35,000 - $49,999	58.6%	77%
$50,000 - $74,999	73.2%	86%
$75,000 and above	86.3%	91%

Table 6

Internet Penetration [43]
U.S. v. San Diego by Income

Income Level	U.S.	San Diego
Less than $15,000	12.7%	47%
$15,000 - $24,999	21.3%	46%
$25,000 - $34,999	34.0%	58%
$35,000 - $49,999	46.1%	70%
$50,000 - $74,999	60.9%	80%
$75,000 and above	77.7%	88%

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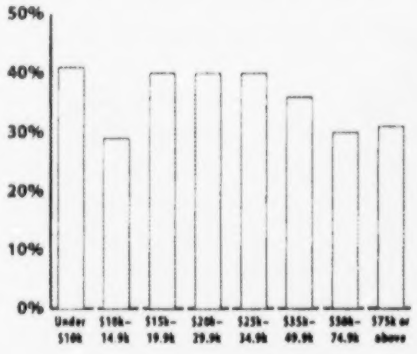
computer ownership and Internet access rise according to income,[41] households with incomes over $75,000 are only about 1.5 times as likely to own a computer as the lowest income groups, and approximately two times as likely to have Internet access in the home. Therefore, the income impact is not as great in San Diego as at the national level.

Nationally and locally, it appears that low-income households, although far behind, are growing at a much faster rate. At all income levels below $35,000 annually, Internet access is growing at a rate exceeding 75% since 1998, and computer ownership is growing at a rate exceeding 25%.[44] In keeping with those national trends, purchase intentions are highest among the low income. With the exceptions of households of $10,000 - $15,000 per year, 40% of all households with incomes under $35,000 per year intend to purchase a computer next year.

Figure 15

Purchase Intentions by Income



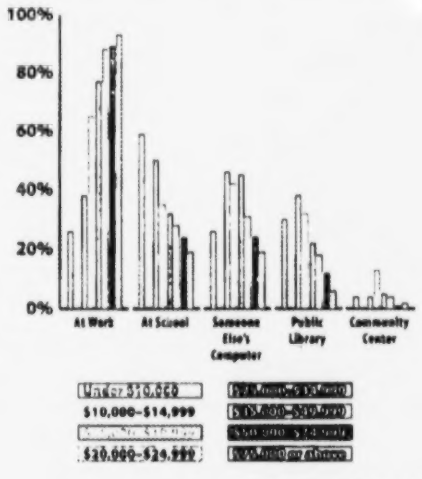
Source: RTA Study

Impact of the Income Divide

Household income does not seem to impact home Internet use—but it does seem to indicate where individuals access the Internet. Most likely related to the jobs of higher income individuals, those at the highest income levels are most likely to access the Internet at work, while those at the lower income levels (of which a significant number are students) access the Internet at school. Aside from those trends, lower income households are more likely to access the Internet at someone else's computer or at a public library, as seen in Figure 16.

Figure 16

Internet Access Sites by Income



Source: RTA Study

Potential Rationales for the Income Divide

The key factors that emerge to explain the income divide resemble the ethnic divide: cost and negative feelings toward computers and the Internet.

Low-income households are clearly driven by economics when deciding whether to make a computer purchase or have home Internet access. 71% of households with income between $10,000 - $15,000 say that the computer's expense is a very important reason for not owning a computer, compared to 21% among households with income over $50,000. In fact, income is often more important than ethnicity in explaining cases when respondents see the expense of buying a computer as a very important factor.[45]

Finally, there is a clear linear relationship between feelings about technology and income levels. As income increases, households are more likely to accept technology. For example, two-thirds of respondents who earn less than $15,000 per year agree that "we have come to rely too much on technology" but only one-third of respondents who earned more than $75,000 agreed with that statement.

[44] NTIA report.

[45] An earlier question addressed purchase intentions by income level. First, this question asked why individuals did not own a computer presently. Second, different individuals may respond differently: a segment of the low-income intended to buy computers but another segment was deterred by cost. Third, some inconsistency in the data is possible.

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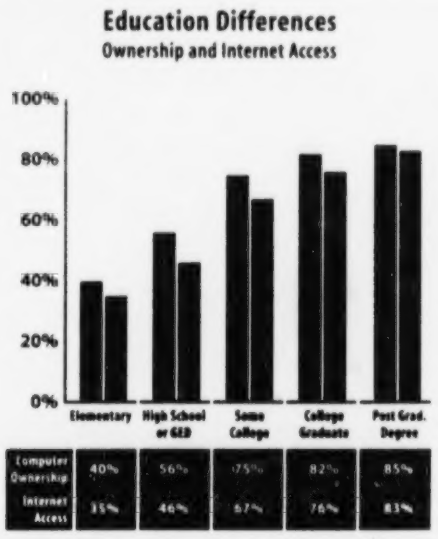
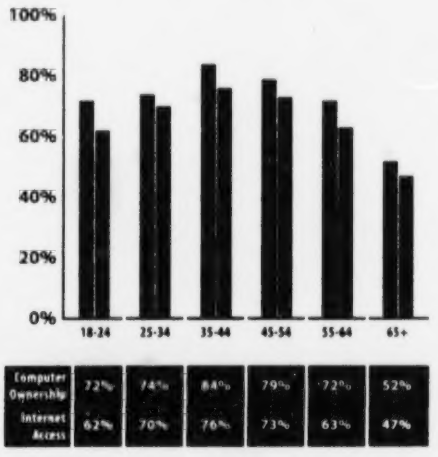
Figure 17



Source: RTA Study

Figure 18



Source: RTA Study

Education

Extent of the Divide

Overall, low education levels will make computer ownership and Internet access less likely, and like income, the divide is about as great as the national divide. Education level, however, is clearly linked to fears of computers, as low education levels often correlate with a failure to buy computers because those with less education do not know how to use them—or how they are important.

Nationally, the divide in Internet access between the most and least educated widened from 48 percentage points in 1998 to 58.2 percentage points in August 2000. Overall, individuals with a college degree are more than four times as likely to own a computer than are those with just an elementary school education. College graduates also are 5.5 times as likely to have Internet access as are those with an elementary school education.[46]

In San Diego, the gap in computer ownership and Internet access between the least and most educated is less wide than nationally; households headed by an individual with a college degree are about twice as likely to own a computer as those headed by a person with less than a high school education. The gap in ownership across these groups is 42 percentage points in San Diego, and slightly higher, 55.8 percentage points, nationally. For Internet access, the gap is 48 percentage points in San Diego and 58 percentage points nationally.

Potential Rationales for the Education Divide

Like the income divide, the education divide is characterized by more negative attitudes toward computers and a sensitivity to cost. Of those without computers, two-thirds of those with a grammar/elementary school education said they do not need a computer at home and 58% said they did not know how to use computers—and that was a very important reason for not having one. Furthermore, 42% of those with a grammar/elementary school education expressed concern about the difficulty of learning to use a computer, and 33% feared giving children access to the computer. Presumably as individuals are more educated and exposed to computers and the Internet, they will be more inclined to recognize their value.

Other Factors

Age

Typically, respondents in the most active age ranges are more likely to own computers, as shown in the chart, with 84% computer ownership among 35–44 year olds. The lowest numbers of computer owners are in the group 65 years and older. In fact, this is where the digital divide appears to be the most significant: seniors are the least likely to own a computer (52%) and have household Internet access (47%), least likely to buy a computer (15%), least likely to use the Internet for anything but email, and most likely to say they do

[46] NTIA report.

not want Internet access (24%).

Furthermore, more people over 65 (36%) state that not knowing how to use a computer is a very important reason for not having a computer at home, compared to 9% of 35–44 year olds. Interestingly, nationally, among those older than 50, individuals were more than three times as likely to use the Internet if they were still in the workforce.[47]

Finally, the divide impacts youth and families. Of all households, single parents are at the lowest computer ownership rates, 64.47%, 20 percentage points behind the highest family group—two-parent families with children. Furthermore, according to a survey of youth at community centers, 56% of those surveyed said they did not have a computer at home, and 62% said they would use computers if they were more available.[48]

Employment Status

For those respondents who are employed full-time, proportions of computer ownership is generally higher than for non full-time employees, although the employment factor, in most cases, is not as great as some of the other factors discussed earlier.

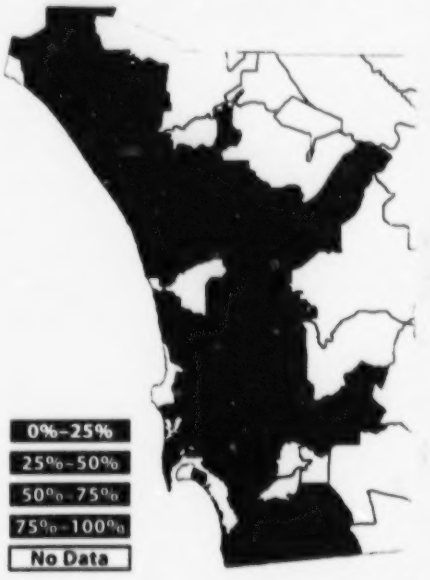
First, full-time employment has a positive impact on computer ownership: 91% Asian, 83% Caucasian, and 71% African-American households with full-time employees own computers. However, full-time employed Hispanics did not increase beyond the average for Hispanics. In fact, full-time employment had less of an impact for all ethnicities except African-Americans. Furthermore, full-time employees owning a home computer are more likely to have Internet access from ho ne (94%) than other employment categories.

Geography

Suburban zip codes with relatively high levels of average income and education expectedly tend to have higher rates of home computer ownership. Relatively lower rates are encountered in southern and eastern portions of San Diego, parts of downtown, areas around Barrio Logan – Logan Heights. These areas are characterized by generally lower household incomes, lower housing and rent values, and higher rates of Hispanic and African-American population.[49] However, direct analysis of relationships between ethnicity and computer ownership is more reliable than similar conclusions based on data aggregated by zip codes.

Figure 19

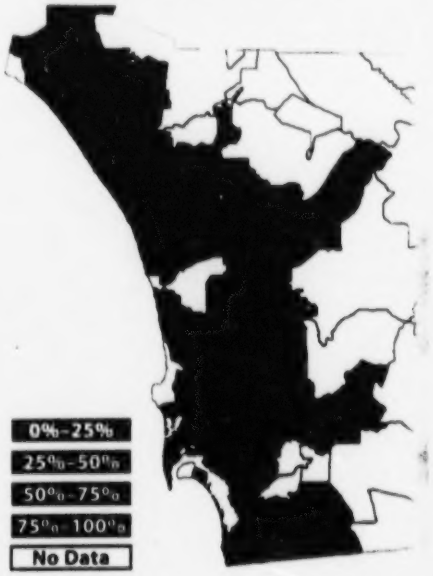
Percentage of Computer Ownership
in San Diego County by Zip Code



Source: RTA Study

Figure 20

Internet Access from Home
in San Diego County by Zip Code



Source: RTA Study

[47] With respect to attitudes, lack of time for using a computer appeared to be a very important concern by single parents with children under 18 (30% versus 9% for unmarried adults, who presumably may have more time for computing).

[48] RTA conducted a survey of 63 individuals during fall 2000 assessing interest and use of computers and the Internet at three community centers in San Diego County.

[49] San Diego County Alcohol and Drug Services, the San Diego Police Department, San Diego County Office of Education, the University of California San Diego's Department of Urban Studies and Planning. The Quality of Life Project. January 2001. http://www.qolsandiego.net

General Strategies to Bridge the Divide

Several mechanisms have been utilized to help bridge the digital divide, including programs to enhance access for all Americans through community access centers and programs for schools and libraries and educational programs to enhance Americans' readiness to use the Internet and the information resources it offers. Each of these mechanisms is reviewed briefly below.

Provide Public Access to Computers and the Internet

Community Technology Centers

Community Technology Centers (CTCs) provide access to computers and the Internet, enabling a low-cost method for minority groups, lower income, less educated and other groups to obtain digital access without the expense of purchasing a computer. CTCs exist in a variety of forms, include multi-service agencies, community networks, adult literacy programs, job training and entrepreneurship programs, public housing facilities, YMCAs, public libraries, schools, cable television access centers, and after-school programs.[50]

Studies of the impact of community technology centers found that they have both individual and community impacts. Community impacts include building collaborations across community agencies and helping local

[50] Clifton Chow, Jan Ellis, June Mark, and Bart Wise, *Impact of CTCNet Affiliates* (Newton, Massachusetts, 1998) Introduction http://www.ctcnet.org/impact98/imp98ch1.htm

DIGITAL CONNECTIONS

The RTA has expanded its technology outreach initiatives and developed the "Digital Connections" program to provide technology planning, training, and maintenance support services to community centers in the region's underserved neighborhoods. The RTA has a track record of helping low-income community centers access computers and Internet technologies. To date, the RTA has installed computers and DSL lines, and overseen training and programming, for five community centers throughout San Diego County. These centers include a center for the deaf, a center for disadvantaged children and youth, and a center for those severely in need of technology resources. At one center more than 95% of girls and boys had never used a computer before the RTA installed one.

The RTA will build on its past performance by providing technical support and training for community technology centers throughout San Diego County, serving dozens of community centers by providing technical toolkits, training manuals, and training support for center constituents, volunteers and staff. There will be five stages of services included in this support:

Technology Assessment and Planning
Assessing an organization's past, present and future technology resources for providing the most valuable services and support for staff and constituents.

Computer Maintenance and Technical Support
Assisting community centers with tech support, computer repairs and maintenance.

Computer and Internet Training Workshops
Conducting technology-training classes in Windows, Microsoft Office, and the Internet as well as specialized workshops for the individual needs of community center constituents.

Technology Toolkit
Delivering an easy-to-follow, valuable collection of online resources to help guide community center directors and staff to leverage their technology services and resources. The "Toolkit" is comprised of three parts: an administrative resource guide, a technology resource guide, and a tool pack used to service computer problems at each community center.

Technology Volunteers
Providing a matchmaking service that will help bring skilled community volunteers to community centers in need of specifically tailored technology projects.

For more information, visit www.sdrta.org. 23

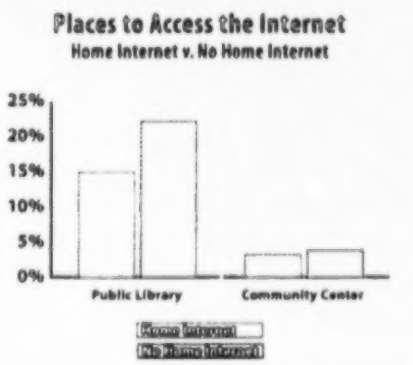
agencies generate revenues beyond grant sources.[51] The physical and social environments of Community Technology Centers create supportive systems that can enhance learning.[52] Specifically, in a comprehensive study of community technology centers, researchers found that 65% of respondents had used the computer to improve their job skills, 51% felt more positive about themselves as learners by participating in classes, and 82% believed that a comfortable and supportive atmosphere was the most important reason for visiting a technology center. Overall, the survey found community technology centers led to (1) an increase in job skills and access to employment opportunities; (2) an improved outlook on learning and new educational goals; (3) technology literacy as a means to achieve individual goals; (4) new skills and knowledge; (5) personal efficacy and affective outcomes; (6) new uses of time and resources; (7) increased civic participation; and (8) social and community connections.[53]

In fact, community centers and libraries are more likely to be used by those without home access. As shown in Figure 21, public libraries and community centers are key strategies employed by individuals without a computer at home. On the other hand, those with a computer at home are more likely to access the computer at home or work.

In San Diego, more than 80 community technology centers exist.[54] These centers range from the MAAC Project, a developer for affordable housing that incorporates computer centers into its projects, to the Urban Corps, a center for youth training that incorporates computers into its curriculum. In addition, "mobile" computer labs exist, through programs such as Jewish Family Services, the San Diego County Office of Education, and others.

Furthermore, a number of programs support community technology centers. For example, the Regional Technology Alliance's Digital Connections program provides technology planning, technical support, and training for constituents and staff regarding the use of computers, in partnership with Coleman College, San Diego State University, and San Diego City College. The San Diego Futures Foundation donates computers to help start community technology centers; formed through San Diego County's information technology outsourcing contract, the Foundation places 3,000–5,000 computers per year throughout the region. Making Connections and InfoTAP address the "organizational divide" by focusing on the information technology needs of the organization, i.e., the back-office and staff needs of nonprofit organizations. Finally, a national program, PowerUP, sponsored by the Waitt Family Foundation, America Online, and other national partners, provides comprehensive equipment and networking to transform community centers into community technology centers.

Figure 21



Source: RTA Study

TESTIMONIAL

YWCA San Diego County

Jessica, a fourth grader, is excited to hear that the YWCA is getting a computer lab. There are only a couple of computers in her class at Holmes Elementary, and the children must take turns using them throughout the day. "We had a computer at home that we got from the swap meet," Jessica says, "but it broke and we didn't know how to fix it. We didn't have one for a while, then my grandpa got one from work. It cost $100."

Jessica thinks computers are important and would like her brothers and sisters to know how to use a computer too. "You can learn a lot from them, it will make you smarter," says Jessica. "Mostly everybody around has computers, but not here, because they probably can't afford it."

Some day, Jessica would like to be a person who works at shelters like the soup kitchen she eats at. "They have 90 items to choose from, and you don't need to wait in line or anything for your food," explains Jessica.

[51] June Mark, Janet Cornebise and Ellen Wahl, *Community Technology Centers: Impact on Individual Participants and Their Communities* (Newton, Massachusetts, 1997) 3 http://www.ctcnet.org/eval.html.

[52] Bohland, et al. 19.

[53] Chow, et al. Introduction.

[54] Susan Myrland, Principal, Interactive Media Management, personal interview January 2000.

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The E-Rate program for schools and libraries

The federal E-Rate program extends universal service to schools, libraries and rural health care providers, and has helped connect more than 80,000 schools and libraries to the Internet. The Education Rate (E-Rate) program was created by Congress as part of the Telecommunications Act of 1996, to use fees from the telecommunications industry to fund discounts on local area networking, Internet service and telecommunications services to public schools and libraries. The poorest applicants receive discounts of up to 90% and rural communities can receive an additional discount of up to 10%. Since 1998, the E-Rate Program has provided nearly $4 billion in funds. [55]

Education to Enhance Readiness

Education for Children

Almost all public schools are now connected to the Internet. In 1999, 95% of K-12 schools had at least one Internet connection, and 63% of all instructional classrooms are now wired. However, at an average of six to seven students per computer, the number of students per computer is still higher than the four to five deemed desirable for the most effective use of computers within the schools.[56] In San Diego, the average number of students per computer dropped from 9.0 in 1997 to 7.2 in 1999, slightly lower than the statewide average of 7.5 students per computer.[57]

A number of programs have been set up by school districts throughout San Diego to leverage the school as a source for Internet access. For example, the Sweetwater Union High School District received a California State Technology Literacy Challenge Grant to provide seventh and eighth grade students with a computer and Internet access at no cost. Participating schools include National City Middle School, Granger Junior High and St. Charles School. LemonLink is a nationally recognized project in Lemon Grove, funded by Microsoft, Compaq, Cox Communications, Cisco, Citrix, Bell and Howell, and others. The project uses microwave and fiber to connect classrooms, homes, City Hall, a teen center and a senior center. In this project, the school district functions as an application services provider, enabling the entire community to access school resources at any location. Digital Bridge is a program of San Diego State University and the San Diego Communications Council, funded by Cox, Pacific Bell, Qualcomm and the Waitt Family Foundation, that creates a "smart" classroom at Hoover High (and also construct a computer lab in a building that will house the City Heights Community Development Corporation).[58]

Education for Adults

Community colleges and adult education programs have also installed computers and Internet access and provide training to prepare adults to utilize information resources available via the Internet. For example, the California Community Colleges' Technology and Telecommunications Infrastructure Program has provided funding for broadband access, linkages to the California State University network, and satellite downlinks to ensure that all of California's community college students have access to the Internet and the educational and information resources it offers.

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[55] Technology & Learning, *Beyond the Digital Divide: Pathways to Equity* May 2000.

[56] National Center for Education Statistics, *Stats in Brief: Internet Access in U.S. Public Schools and Classrooms: 1994-1999* (Washington, 2000) 1.

[57] California Department of Education, Education Demographics Unit, *County level Data-San Diego, 1999-2000* (Sacramento, 2000).

[58] Susan Myriand, Principal, Interactive Media Management, personal interview January 2000.

Recommendations for San Diego Initiatives and Conclusion

This report paints a picture of those individuals on the other side of the digital divide. They are mostly African-American and Hispanic, lower income and less educated, single parents and the elderly. In that sense, the digital divide is like many of the other divides that section off society.

However, this divide is significantly compelling because it involves so little: access and knowledge of some simple tools—the Internet and computers—that can remove equity barriers by making more information available and ensure continued economic growth through a technically proficient workforce.

The research indicated that improving the level of education can bridge this divide, as can increasing the household incomes for the most disadvantaged. But these are broad societal solutions for multiple problems. The following recommendations suggest specific strategies to focus on the digital divide. Therefore, based on the information gleaned in this report, and the strategies employed in other areas, the RTA recommends the following actions:

Outreach to the Unwired to Educate Them on the Use and Benefit of Information Technology

Those groups without computers and access to the Internet cited, disproportionately, a lack of knowledge and understanding of computers, and even more broadly, technology. One-third of African-Americans, Hispanics, homemakers, the elderly, the low-income (less than $20,000 annual household income), and the less educated (with high school education or less) said they did not own a computer because they did not know how to use one. One-third of the low-income said they did not own a computer because it was too difficult to use and they would not know what they would use it for. More than 50% of Asians, African-Americans and Hispanics believe that people rely on technology too much, and more than half of Asians and African-Americans believe that technology poses a threat to freedom. Two-thirds of those with annual incomes less than $15,000 believe that people rely too much on technology.

TESTIMONIAL

URBAN CORPS SAN DIEGO

After teaching disadvantaged youth at the Urban Corps of San Diego for almost two years, Sarah has seen the value of technology in the classroom grow. "As my experience with computer technology grows, I have come to realize how essential computer literacy is to an individual's ability to function successfully in both their professional and personal life," says Sarah.

Computer technology is the crucial tool that transfers the Urban Corps education program from its headquarters in Victorville, CA to the local charter school, currently located in the Naval Training Center in San Diego, CA. Sarah has acquired most of her computer skills via the Internet, as a result of having to administer the charter school curriculum from the headquarters to the local chapter. She has gained these skills, little by little, through much trial and error, and out of dedication to assist her students develop career plans, resumes and employment strategies, which she hopes will help them find gainful employment after the Urban Corps.

"The Internet offers a much wider variety of reference materials than the resources available in the classroom, given the financial and spatial constraints of our program," explains Sarah. "Access to these resources gives students a much broader range in which to explore and increase their knowledge about the world—past, present, and future. This enables them to participate more fully in it."

As Sarah continues to improve her computer skills, technology is expanding the realm of possibilities ahead for her and her students. "With my increasing knowledge of computer technology and its issues, I am becoming more aware of its value and I am now seriously considering buying a computer of my own."

Furthermore, the most technology-detached—those who do not own a computer or access the Internet anywhere—are significantly influenced by the people around them. The fact that they were digitally detached was more significant than any other factor—ethnicity, education level or income—in not owning a computer.

Therefore, because a segment of the population lacks absolute awareness of computers—and how computers can benefit their lives—initiatives, such as a community outreach campaign should focus on conveying this message. Through schools, public forums, and community centers, the unwired need to learn about the benefits of information technology to strengthen San Diego neighborhoods.

Support Community Technology Centers and Support Programs that Enhance Community Technology Centers

As detailed in the report, those without home Internet access are more likely to use libraries and community centers than those with home Internet access. The figures are replicated along demographic lines: African-Americans use community centers more than other ethnic groups; Hispanics are more likely to use the Internet outside their homes.

Therefore, community technology centers and public schools can provide direct, hands-on digital connections to complement the general awareness of computers and technology. As detailed above, community technology centers develop local programs that match local needs—and serve as a comfortable meeting place for the unskilled to directly touch computers. Public schools—both for adults and children—can also facilitate this interaction through some of the programs articulated previously.

Specific community technology centers can help bridge the divide—but alone they will not progress. Programs like PowerUP and the San Diego Futures Foundation provide the physical infrastructure for establishing community technology centers in an organized and effective manner. And others like the RTA's Digital Connections program provide the additional infrastructure—the training of center staff and constituents, the technical support, the technology planning—that can determine whether or not these community technology centers develop a vital community computing resource, or simply a lone computer that sits idle for most of the day. Simply dropping off computers will not solve the digital divide if no staff member can fix the broken device. Therefore, a comprehensive program that plans, supports and trains community centers can help bridge the digital divide.

Investigate Novel Methods to Support Computer Ownership

Because San Diego is so close to solving the divide, a number of novel notions should be explored. These should be studied, of course, but they could vary from keeping library hours open until midnight, to supporting programs like the Sweetwater School District's loaned computer program (or those for public employees), to even more bold statements: what if every single parent with an annual income below $25,000 received a free computer? A number of initiatives should be explored.

Convene a Community Forum to Discuss Best Practices and Techniques

Because this community problem requires community solutions, a forum bringing together business leaders, community leaders, foundations and education leaders could produce creative solutions to solving the digital divide in San Diego. This forum would not only enable the community to explore creative methods to bridge the divide, it would also enable community leaders to understand the best methods.

The insidious digital divide is a simple problem with enormous implications: not accessing and understanding how to use computers and the Internet cuts off significant populations from modern social and economic life. As a matter of equity and economics, the issue poses concern. San Diego must now demonstrate the initiative to solve this community problem.

Mapping a Future for Digital Connections:
A Study of the Digital Divide in San Diego County

About this Study

METHODOLOGY

Overall, the RTA engaged in this six-month study by first conducting background research on the digital divide and surveying the literature of published studies. The RTA then conducted a comprehensive survey of 1,000 County residents, querying them on computer ownership, computer use and various demographic profiles. A statistician analyzed the data to understand the impacts of various factors. And the analysis was balanced by interviews of those impacted by the divide.

The survey was devised by the RTA, in consultation with representatives from the UCSD Civic Collaborative. To the greatest extent possible, the RTA modeled the questionnaire after the federal digital divide survey conducted by the U.S. Department of Commerce's National Telecommunications and Information Administration, which has performed four studies of the digital divide nationally.

Luth Research conducted 1,000 telephone interviews among San Diego County residents 18 years of age or older. The sample was made up of 18 communities in San Diego; each community was represented in the sample based on its percentage of residents for San Diego County. The 18 communities were Carlsbad, Chula Vista, Coronado, Del Mar, El Cajon, Encinitas, Escondido, Imperial Beach, La Mesa, Lemon Grove, National City, Oceanside, Poway, San Diego, San Marcos, Santee, Solana Beach, and Vista. Each interview lasted approximately 10 minutes. The surveys were administered by a trained market research interviewer using the CATI system (computer assisted telephone interviewing). The interviews were conducted between October 18 and November 19, 2000.

Ilya Zaslavsky, Ph.D., of the UCSD Supercomputer Center and a graduate of the University of Washington, conducted the statistical analysis. Zaslavsky examined the data supplied by Luth, paying particularly close attention to the role of ethnicity as a factor of the digital divide in San Diego, as considered in various contexts of employment, age, family status, income and education. When analysis focuses on small groups distinguished by a range of characteristics (such as belonging to particular demographic or social-economic categories), standard statistical measures of categorical association for contingency tables are often unreliable simply due to small counts of respondents in such groups. An additional reason to abandon chi-square-based and related statistical models is the strong non-linearity of many relationships encountered (for example, when just one of the categories composing a categorical variable has strong influence on a particular categorical outcome while other categories appear irrelevant: such cases are especially poorly described by common statistics). For these reasons, the Center turned to a technique that focuses on the accurate manipulation of conditional frequencies in multi-dimensional contingency tables, in various contexts, and does not require distributional assumptions.

The technique is called Determinacy Analysis and is implemented in software DALSolution 4.0. The goal of determinacy analysis is the development of explanatory rules from survey data, such that these rules are as accurate and complete as possible. Accuracy of each rule is computed as a ratio of the number of cases when the rule is confirmed to the number of applications of this rule. It reflects one's confidence in a statement expressed by the rule. Completeness of a rule reflects the proportion of cases "explained" by the rule, and is computed as a ratio of the number of rule confirmations to the count of cases one seeks to explain. In addition, each explanatory factor in a rule is characterized by this factor's contribution to rule accuracy (computed as the accuracy loss or gain should this factor be removed from the explanation). More information about the method is available at www.dalsolution.com.

Darin Forkenbrock, a consultant, conducted initial background research on the digital divide, along with the RTA's director of community development, Meredith Dowling. Phyllis Sensenig, of the San Diego Community College District, analyzed the background information. Susan Myrland, an RTA Board member who helped put together some of the first community technology centers in San Diego, advised on the project.

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Study Partners

California Technology, Trade & Commerce Agency

The California Technology, Trade and Commerce Agency

The California Technology, Trade & Commerce Agency (TTCA) serves as the State's principle catalyst for innovation, investment and economic opportunity, enhancing the quality of life for all Californians. The Division of Science, Technology and Innovation—a unit of TTCA—is responsible for promoting smart tech policy, developing supportive programs and forming turnkey partnerships to ensure a technology-driven economy for all Californians. DSTI helps small businesses use and access technology, provides funds and technical assistance for the development and commercialization of innovative products, and works at the intersection of public, private and non-profit to foster understanding and enhance California's technology-based economy.

THE WAITT FAMILY FOUNDATION

Waitt Family Foundation

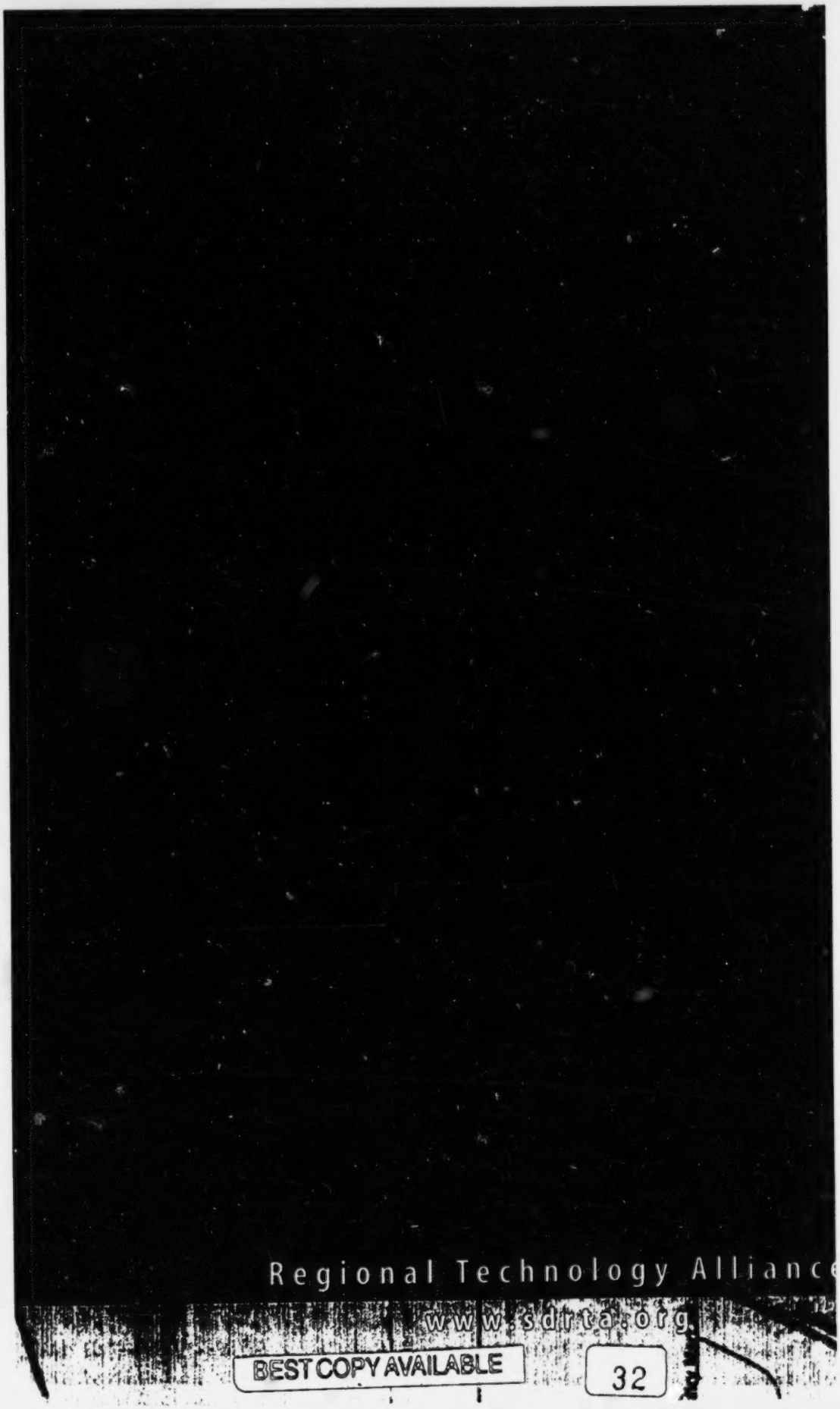
Helping Good People Do Great Things

The Waitt Family Foundation is dedicated to helping good people do great things. The organization was founded in 1993 by Ted Waitt, the Co-Founder and Chairman of Gateway Computers. A key element of the Foundation's mission is straightforward: to impact individuals, families and communities through technology-based programs and initiatives that result in systematic change for all involved. The Foundation is currently undergoing a period of remarkable growth and dynamism. Anchored in the belief that the future is something we create, the Waitt Family Foundation seeks to open the doors of opportunity to individuals and families in need. The Foundation divides its work among three areas of concentration: Future Studies; Contemporary Issues; and Historical Studies. Guided by the notion that the gap between what can be imagined and accomplished has never been smaller, the Future Studies division addresses, in part, the impact of technological innovations on our future as a planet. The division then seeks to gain consensus among global stakeholders on the possible and desired future. The Contemporary Issues division tackles a diversity of issues ranging from families in crisis to children in need. As part of the "PowerUP: Bridging the Digital Divide" program, the Foundation has committed to the donation of up to 50,000 computers and Internet appliances over the next three years.

SAN DIEGO WORKFORCE PARTNERSHIP

San Diego Workforce Partnership

The San Diego Workforce Partnership, a public/private partnership between the City and County of San Diego, has been developing and implementing regional *workforce solutions*℠ for more than twenty-six years. We have transformed into a streamlined organization capable of responding to a dynamic market-driven environment, and we have expanded our services to include all employers and job seekers. Businesses look to us for qualified employees, for expertise in job training and supportive services, for labor market information and for leadership to mobilize public and private organizations to address workforce needs. Individuals look to us for referral to and placement in high quality jobs and/or education or training programs. As the "workforce broker" for the region, our mission is to coordinate a comprehensive workforce development system that ensures a skilled, productive workforce to support a healthy economy throughout San Diego. For more information about the Workforce Partnership's programs and services visit SanDiegoAtWork℠.com.



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